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ABSTRACT

A reasonably accurate knowledge of the location of certain learning functions has been achieved through the steady accumulation of data concerning hemispheric specialization. One learning disabilities teacher (van den Honert, 1977) applied hemisphere specialization techniques to eliminate processing conflicts between the hemispheres by sending word information to the left hemisphere while occupying the right hemisphere with noncompeting information. The Loveless-Blau technique is another example of an effort to employ neuropsychological concepts to learning. Concentrating on spelling, these researchers cut off the visual modality altogether. The purpose of the technique was to stimulate the right hemisphere, linked specifically to "manual pattern" recognition, by using the tactile modality of left hand to right hemisphere. Further investigations using matched groups of learning disabled students are needed to determine which multisensory techniques are most effective: those using the right hand alone or those using the left hand alone. More research needs to be done on the absence of the visual input while learning spelling from raised letters. Also to be explored is a procedure for learning words utilizing the concomitant use of visual stimulation either in the form of picture or configuration cues. While successful reading and writing requires the interaction of both hemispheres for normal learners, the activation of right hemisphere processing alone may hold more promise for the severely word-disabled. (Sixteen references are attached.) (MG)

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WORD LEARNING: Using the Right Brain

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Data concerning hemispheric specialization have been accumulating steadily throughout the seventies, and we now have reasonably accurate knowledge of the location of certain learning functions. We are beginning to understand that puzzling educational phenomena have a plausible physiological, neurological basis.

The left hemisphere of the brain is specialized for linguistic, analytic, abstract, sequential processing (Witelson 1976). It "puts it all together," as in remembering facts in an orderly, systematic way and producing them on demand. It is the part of the brain we all use in conceptualizing an outcome and working out a strategy to achieve it. These are the very abilities we require of kids in school, and this is why school is often described as "left brained."

The right hemisphere is used for nonlinguistic, spatial (artistic), holistic processes including manual pattern recognition (Masland 1979). For example, recognition of faces, objects, and place, and the ability to see many details at once as a whole are

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right brain functions. The right brain is also dominant when tactile, kinesthetic, and auditory modalities are utilized (Bogen 1977; Fox 1979).

Alex Bannatayne (1971) suggests that learning disabled students have a visuo-spatial organized brain with an "executive control" center in the spatially oriented right hemisphere which dominates the whole brain, including left-hemisphere language functioning. Sandra Witelson's studies (1976, 1977) seem to confirm the visual-spatial superiority of dyslexic children. Her results indicated that spatial functions in dyslexics are represented in both hemispheres in contrast to normal children's exclusive spatial specialization in the right hemisphere. Thus learning-disabled children often exhibit both a deficiency in the linguistic, sequential, analytic mode of information processing and an intact or over-developed facility in the spatial, holistic mode. This suggests that learning-disabled children with traditional deficits in the storage and retrieval of printed words may not profit from analytic activities that are beamed to their left hemispheres.

Our knowledge of what each hemisphere contributes to learning is based partly on direct brain study of patients with known brain injuries and visible symptomatic consequences, and partly from ingenious noninvasive, indirect procedures involving handedness, eye dominance, and dichotic listening (Harris 1979). Witelson (1976) added shape and letter discrimination tactual stimulation tasks as a way of studying hemispheric specialization in normal and dyslexic boys. One task required the subject to feel nonsense shapes, which were out of view, in each hand. While the normals showed right brain superiority for nonsense shapes (configurational processes) and left brain superiority for letters (language mediation), the dyslexics showed a greater left hand score for the recognition of letters suggesting greater involvement of the right hemisphere with spatial-holistic processing strategies.

Part-to-whole word training may not be beneficial for learning-disabled children with poor word attack and spelling skills. As one of Dr. Seuss' characters was wont to say, "something is not right" with remedial techniques that require reading/spelling deficient children to regard words as composed of separate and distinct entities which must be meticulously assembled (blended) to form a word. This may be analogous to asking them to recognize a nose, chin, eyes, and other facial

details as separate entities before "seeing" or blending them all into a face.

Utilizing Hemispheric Specialization

One learning disabilities teacher (van den Honert 1977) applied hemisphere specialization techniques to eliminate processing conflicts between the hemispheres by sending word information to the left hemisphere while she occupied the right hemisphere with noncompeting information. She stimulated the left and inhibited the right by using the following procedures with junior high students:

> Right ear to left hemisphere: received instruction in spelling via one separate earphone;
>
> Left ear to right hemisphere: heard rock-and-roll music via separate earphone;
>
> Right eye to left hemisphere: cleared for reading practice by removal of right lens of sunglasses;
>
> Left eye to right hemisphere: visual signals cut off blackened left lens of the same sunglasses.

Of the group of dyslexics to whom this method was applied, the younger seventh graders gained substantially, but the older ninth graders did not. Van den Honert hypothesized that the seventh graders were still so young that neurological brain patterns could be affected by the lateralization treatment procedure. However, the physiology of the visual modality makes differentiating the left and right visual fields a highly complex experimental procedure. It cannot be accomplished by the simple act of eliminating a lens from a pair of sunglasses as van den Honert tried to do.

Interestingly, van den Honert tried one other technique using raised letters, which she abandoned for lack of reading progress. With the fingers of the right hand, the child felt raised plastic letters which were out of sight, and then reported the word. Van den Honert correctly hypothesized that what is felt with the right hand goes automatically to the left brain, the language center. However, her technique might have yielded better results had she used the fingers of the left hand rather than the right. Feeling words with the left hand helps children who have strength in the visuo-spatial brain to visualize the shape of the whole as well as the individual letters.

Left hand to Right Hemisphere

The Loveless-Blau (1980) technique is another example of an effort to employ neuropsychological concepts to learning. Concentrating on spelling, these researchers cut off the visual modality altogether, a technique previously reported by Blau and Schwalb (1969). Instead of a blindfold, however, Loveless and Blau used a pair of goggles rendered totally opaque with masking tape to avoid any irrelevant muscle stimuli on or around the eyes that might be caused by a blindfold or by an effort to close the eyes or deliberately to look away. The opaqued goggles were presumed to give the feeling of simply not seeing, rather than of straining not to see. Subjects ranged in age from 9 to 12 and had normal IQs.

The purpose of the technique was to stimulate the right hemisphere, linked specifically to "manual pattern" recognition, by using the tactile modality of left hand to right hemisphere. The child was seated beside the experimenter who voiced a word drawn from a pool of unknown words and then, using three-dimensional letters, placed the appropriate ones, in proper sequence, one at a time, in the child's *left* hand while naming each letter.

The child echoed the word and each individual letter while manipulating the letters, one by one, with the fingers of the left hand so as to establish its shape and identity clearly although unable to see them.

After three such sequencing runs, the letters were scrambled and the child, still goggled and still using only the left hand, restored the letters to their proper sequence. The experimenter helped by confining the scrambled letters to a limited area and by taking them aside as they were correctly sequenced. Each letter was verbalized, as was the word at the end of the unscrambling process – the say-spell-say method. This was also done three times. (The three-fold repetition of each phase was an arbitrary decision.)

The next step was to make intensive use of the kinesthetic modality by having the child write the word three times while goggled. The child used his preferred hand, which was guided by the experimenter to a convenient spot on the practice sheet. Activation of the visual modality was the last step. The goggles were removed and the child visually examined the pattern of the assembled and written words. Then he wrote the learned word repeatedly, normally, from memory, covering each one to avoid

copying. When the same procedure was repeated using the children's right hands, it was found to produce substantially inferior results in immediate recall but not in delayed recall.

These investigations point to the conclusion that tactual stimulation and kinesthetic movement are necessary ingredients in word mastery, especially for LD students. This is no doubt why the Fernald VAKT method (1941) has proven effective with severely disabled readers and spellers. In the Fernald procedure, the child focuses on the configuration of a whole word while all the features of the word are touched and traced. Skilled movements required during writing necessitates the concerted neural activity of both hemispheres: the left hemisphere verbalizes the word while the right hemisphere is responsible for the correct use of space in letter formation (Frostig and Maslow 1979).

Future Strategies for Word Learning

Further investigations using matched groups of LD students are needed to determine which multisensory techniques are most effective: those using the right hand alone or those using the left hand alone. Witelson's (1976) and Loveless and Blau's (1980) procedures clearly suggest that left-handed perception of raised letters may be the most efficacious method of word learning for some learning-disabled students. The raised letter technique with accompanying verbal input via the right ear may prove to be doubly rewarding.

More study needs to be done on the absence of the visual input while learning spelling from raised letters. Occluding vision seemingly stimulates the tactile, kinesthetic brain center to reorganize its strategy for identifying words. The right hemisphere of a spatially competent learner would then be consciously directed to perform even better. The method of Tarnopol and Tarnopol (1977) established linkage among kinesthetic, visual, auditory, and linguistic brain circuits in learners having very poor visual memories. In their procedure, the teacher guides the child's hand while the child writes either blindfolded or with eyes closed and pronounces the letter sounds. This is repeated until the writing of the word becomes automatic.

Also to be explored is a procedure for learning words utilizing the concomitant use of visual stimulation either in the form

of picture or configuration cues. Rico (1978) described a configurational strategy that integrates left- and right-brain processing during word associations. Starting with a single word, children are asked to name other words that relate to that focal word. As words are named, associations based on literal (left brain) and connotative (right brain) meanings are arranged in a configurational scheme around the focal word. Children see both the visual form of each word and the configurational web showing how words are related to one another. Sinatra (1980) has described three ways that teachers of learning-disabled children can use visual stories to help children compose and organize written stories. The visual stories act as concrete stimuli to evoke words and sentence patterns from children with language deficits.

While successful reading and writing requires the interaction of both hemispheres for normal learners, the activation of right hemisphere processing alone may hold more promise for the severely word-disabled. While brain function is apparently unalterable, brain *strategies* may be redirected as required (Cruickshank 1977), linking perceptual processing, sensory modalities, and neurological data in an effective psychoeducational match for each child.

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